Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Claims 1-76 (previously canceled).

77. (currently amended) A method of forming a masking pattern on a surface, said method comprising the steps of:

using ~~the technique of~~ drop-on-demand printing to deposit from a droplet deposition apparatus a plurality of droplets on to a surface to form a masking pattern, said droplets passing through an operating zone located between the deposition apparatus and the surface; and

locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the surface, thereby controlling ~~the~~solidity of the masking pattern.

78. (previously added) A method according to Claim 77, wherein the formation of the masking pattern is controlled so that the masking pattern has predetermined structural properties.

79. (previously added) A method according to Claim 77, wherein the operating zone extends from the deposition apparatus to the surface.

80. (previously added) A method according to Claim 77, wherein relative movement is effected between the deposition apparatus and the surface so as to move said operating zone across the surface during formation of the masking pattern.

81. (previously added) A method according to Claim 77, wherein the local environment of the operating zone is controlled so as to control the coalescence of the droplets on the surface.

82. (previously added) A method according to Claim 77, wherein the local environment of the operating zone is controlled so as to control the spreading of the droplets on the surface.

83. (previously added) A method according to Claim 77, wherein the local environment of the operating zone is controlled so as to control placement of the droplets on the surface.

84. (previously added) A method according to Claim 77, wherein the local temperature of the operating zone is controlled so as to control the rate of solidification of the droplets on the surface.

85. (previously added) A method according to Claim 77, wherein the local atmosphere of the operating zone is controlled.

86. (previously added) A method according to Claim 85, wherein an at least partial vacuum is generated in the operating zone so as to substantially avoid contamination of the droplets during passage from the deposition apparatus to the surface.

87. (previously added) A method according to Claim 85, wherein a pressure differential extending between the deposition apparatus and the surface is established in the operating zone.

88. (previously added) A method according to Claim 85, wherein an inert or reactive gas is introduced into the operating zone during droplet deposition.

89. (previously added) A method according to Claim 77, wherein the duration of the local exposure of the operating zone to electromagnetic radiation is controlled so as to control the spreading of the droplets on the surface, thereby controlling the resultant shape of the masking pattern.

90. (previously added) A method according to Claim 77, wherein the intensity of electromagnetic radiation is controlled so as to control the spreading of the droplets on the surface, thereby controlling the resultant shape of the masking pattern.

91. (previously added) A method according to Claim 77, wherein the operating zone extends to the surface, and local exposure of the operating zone to electromagnetic radiation is carried out subsequent to the deposition of droplets passing through the operating zone.

92. (previously added) A method according to Claim 91, wherein the time period between the deposition of droplets on the surface and said local exposure is controlled so as to control spreading of the droplets on the surface.

93. (previously added) A method according to Claim 92, wherein said time period is in the range from 1 to 2000 ms.

94. (previously added) A method according to Claim 93, wherein said time period is in the range from 50 to 300 ms.

95. (previously added) A method according to Claim 77, wherein said electromagnetic radiation is emitted from a source integral with said deposition apparatus.

96. (currently amended) A method according to Claim ~~95~~ 77, wherein said electromagnetic radiation is emitted from a plurality of sources spaced along the deposition apparatus.

97. (previously added) A method according to Claim 77, wherein the electromagnetic radiation comprises at least one of ultra violet, visible light, infra red, microwaves and alpha-particles.

98. (previously added) A method according to Claim 77, wherein multiple wavelengths of electromagnetic radiation are co-incident sequentially or in parallel on the deposited droplets.

99. (previously added) A method according to Claim 77, wherein the electromagnetic radiation is emitted from at least one light emitting diode.

100. (previously added) A method according to Claim 99, wherein the electromagnetic radiation is emitted from an independently addressable array of light emitting diodes.

101. (previously added) A method according to Claim 77, wherein the electromagnetic radiation is emitted from a semiconductor quantum-well solid state laser.

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102. (previously added) A method according to Claim 101, wherein the electromagnetic radiation is emitted from an independently addressable array of semiconductor quantum-well solid state lasers.

103. (previously added) A method according to Claim 77, wherein the electromagnetic radiation is emitted from at least one light emitting polymer.

104. (previously added) A method according to Claim 103, wherein the electromagnetic radiation emitted from said light emitting polymer is filtered to select a particular wavelength of electromagnetic radiation.

105. (previously added) A method according to Claim 77, wherein the electromagnetic radiation is emitted from a microwave initiated gaseous discharge radiation source.

106. (previously added) A method according to Claim 77, wherein the electromagnetic radiation is emitted from a plurality of optical fibres.

107. (previously added) A method according to Claim 77, wherein the electromagnetic radiation emitted is focused on the droplets.

108. (previously added) A method according to Claim 77, wherein, subsequent to the local exposure of the operating zone to electromagnetic radiation, the deposited masking pattern is fully exposed to electromagnetic radiation so as to ensure that the deposited droplets are cured.

109. (previously added) A method according to Claim 77, wherein the distance between the deposition apparatus and the surface is controlled during droplet deposition so as to control the time taken for a droplet to pass from the deposition apparatus on to the surface.

110. (previously added) A method according to Claim 109, wherein said distance is in the range from 0.5 to 2 mm.

111. (previously added) A method according to Claim 110, wherein said distance is in the range from 0.75 to 1.25 mm.

112. (previously added) A method according to Claim 77, wherein the deposited masking pattern is imaged using imaging apparatus integral with the deposition apparatus.

113. (previously added) A method according to Claim 77, comprising the step of controlling the surface energy of the surface prior to droplet deposition.

114. (previously added) A method according to Claim 113, wherein the surface is subjected to at least one of abrasion, polishing, ozone treatment, plasma exposure and surface coating prior to droplet deposition.

115. (previously added) A method according to Claim 77, wherein the droplets are deposited from a droplet deposition printhead comprising a deposition chamber for housing

said deposition material, an outlet nozzle in fluid communication with said deposition chamber, and means for ejecting droplets of deposition material from said deposition chamber through said outlet nozzle.

116. (previously added) A method according to Claim 115, wherein the droplets are deposited from a plurality of said printheads.

117. (previously added) A method according to Claim 116, wherein the masking pattern is formed from a plurality of deposition materials, each deposition material being deposited from respective deposition printhead.

118. (previously added) A method according to Claim 115, wherein the outlet nozzle is selectively covered to substantially prevent entry of electromagnetic radiation into the deposition printhead.

119. (previously added) A method according to Claim 115, wherein said nozzle is cleaned after ejection of a droplet from said deposition chamber.

120. (previously added) A method according to Claim 115, wherein said outlet nozzle is selectively covered by a nozzle shutter, said shutter comprising means for cleaning said nozzle.

121. (previously added) A method according to Claim 120, wherein said outlet nozzle is cleaned by a movable wiper blade attached to said nozzle shutter.

122. (previously added) A method according to Claim 120, wherein residual deposition material removed from said nozzle by said cleaning means is transferred to a reservoir housed with said deposition printhead.

123. (previously added) A method according to Claim 77, wherein the surface is disposed on a flexible sheet connected between two reels, said reels being rotated to move the surface relative to the deposition apparatus.

124. (previously added) A method according to Claim 77, comprising the step of at least partially removing said deposited masking pattern.

125. (previously added) A method according to Claim 77, wherein said masking pattern is a three-dimensional masking pattern.

126. (previously added) A method according to Claim 125, wherein said masking pattern comprises a plurality of layers of deposition material, said layers being sequentially deposited on said surface.

127. (previously added) A method according to Claim 126, wherein each layer has a respective shape.

128. (previously added) A method according to Claim 125, wherein said masking pattern is formed from a multiplicity of droplets deposited at a plurality of deposition sites on the surface, droplets being deposited at each of said sites in turn.

129. (previously added) A method according to Claim 77, wherein said masking pattern comprises a solder reflow mask.

130. (previously added) A method according to Claim 129, wherein said mask is formed from one of silicone, polyimide, polytetrafluoroethylene and epoxy.

131. (previously added) A method according to Claim 77, wherein said masking pattern is an etching mask.

132. (previously added) A method according to Claim 131, wherein said etching mask is formed from an organic-inorganic fluid.

133. (previously added) A method according to Claim 131, wherein said etching mask is formed from one of epoxy, polycarbonate, silicon, polytetrafluoroethylene, polychlorotrifluoroethylene, polyimide, polyisoprene and polypropylenepolystyrene.

134. (previously added) A method according to Claim 77, wherein said masking pattern is an electrically conductive mask.

135. (previously added) A method according to Claim 134, wherein said mask is formed from one of carbon-based and metal acetate-based material.

136. (previously added) A method according to Claim 77, wherein said masking pattern is a decorative masking pattern.

137. (previously added) A method according to Claim 77, wherein said masking pattern is an ion implantation mask.

138. (previously added) A method according to Claim 77, wherein said masking pattern is a confinement well mask.

139. (currently amended) A method of forming a spacer pattern on a surface, said method comprising the steps of:

using ~~the technique of~~ drop-on-demand printing to deposit from a droplet deposition apparatus a plurality of droplets on to a surface to form a spacer pattern, said droplets passing though an operating zone located between the deposition apparatus and the surface; and

locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the surface, thereby controlling ~~the~~ solidity of the spacer pattern.

140. (currently amended) A method of forming a circuit pattern on a circuit board, said method comprising the steps of:

using ~~the technique of~~ drop-on-demand printing to deposit from a droplet deposition apparatus a plurality of droplets on to said circuit board to at least partially fill via holes formed in the circuit board, said droplets passing through an operating zone located between the deposition apparatus and the surface; and

locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the circuit board, thereby controlling the filling of the via holes.

141. (currently amended) A method of forming a relief pattern on a surface, said method comprising the steps of

selectively irradiating a charged roller to selectively remove the charge on portions of the roller;

using ~~the technique of~~ drop-on-demand printing to deposit from a droplet deposition apparatus a plurality of droplets on to the charged portions of the roller, said droplets passing through an operating zone located between the deposition apparatus and the roller;

locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the charged portions of the roller, thereby controlling ~~the~~ structure of the pattern formed on the roller; and

transferring the deposited material from the roller on to a surface to form a relief pattern on said surface.

142. (previously added) A method according to Claim 141, wherein the relief pattern formed on the surface is subsequently heated to effect material coalescence.

143. (previously added) A method according to Claim 141, wherein the relief pattern formed on the surface is subsequently subjected to radiation curing to effect material coalescence.

144. (previously added) A method according to Claim 141, wherein the relief pattern comprises an organic electrode.

145. (previously added) A method according to Claim 141, wherein said relief pattern comprises an opto-electronic device.

146. (previously added) A method according to Claim 141, wherein the relief pattern comprises a masking pattern.

147. (currently amended) Droplet deposition apparatus comprising a deposition chamber for housing deposition material, an outlet nozzle in fluid communication with said deposition chamber, means for ejecting droplets of the deposition material on demand from said deposition chamber through said outlet nozzle on to a surface, means for defining an operating zone through which the droplets pass between the outlet nozzle and the surface, and means for locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the surface.